Ann. Natal Mus. Vol. 22(3) Pages 885–911 Pietermaritzburg November, 1976

The 'Sangoan' Industries

by

Oliver Davies

(Natal Museum, Pietermaritzburg)

SYNOPSIS

The term 'Sangoan', derived from Sango Bay in Uganda, has come to be used widely and vaguely in Sub-Saharan Africa for industries which are later than the Final Acheulian and are characterized by rather massive picks in addition to other tool-types. This paper examines whether the so-called 'Sangoan' industries in outlying areas, the Guinea coastlands, the Angola coast, Rhodesia, South West Africa and Natal, can justifiably be equated with the Central African industry to which the name is properly assigned.

Large collections of the Central African industry have been made in very few areas, Uganda, Kalambo Falls (not fully published), Lunda, Victoria Falls. It seems that the industries in all these areas are fairly well correlated; they are characterized by picks without pebble-butts, some hand-axes, heavy core-tools and a few small tools. None of them is well stratified geologically, so they cannot be closely dated on a geological time-scale; at some sites finite radiocarbon dates around 45000 B.P. have been obtained, though being close to the limits of radiocarbon these dates are not absolutely trustworthy.

The paper pays particular attention to two areas where numerous 'Sangoan' pieces have been found, the Guinea coastlands and Natal. There is little material from Angola. That from Rhodesia and South West Africa may be descended from the Central African Sangoan but no longer merits the name.

In Ghana the 'Sangoan' industry is later than the high ocean-level probably of Eem II, but is not closely datable geologically. It is characterized by picks, some with pebble-butts, a few hand-axes, no cleavers, large scrapers, gouges and perhaps trap-weights. It does not closely resemble the Central African Sangoan, especially in the form of the picks, nor is there evidence of territorial continuity; so the Ghana industry should be separately defined, and the name Awudome industry is proposed.

In Natal the 'Sangoan' has a coastal distribution and occurs particularly on the coastal dunes. It seems to be later than Eem II, earlier than Brörup or possibly Eem III, and so a good deal older than the finite dates for the Central African industry. Its pebble-butted picks and the rest of its tool-kit are not comparable to the types from Central Africa. So it is proposed to abandon the name 'Sangoan' and revert to the original name, the Tugela industry.

INTRODUCTION

The term 'Sangoan' has been used with increasing vagueness to designate Middle Palaeolithic industries in different parts of Africa. It seems by now desirable to consider whether this name is suitable everywhere, whether all the industries are roughly contemporary, and whether the similarities are due to genetic relationship or to parallel development perhaps caused by widespread ecological (e.g. climatic) changes.

In order not to prejudge the issues, I have, except in my conclusions, used 'Sangoan-type' or 'Sangoan' in inverted commas, to indicate industries which have been called Sangoan. I have divided the paper into two parts, chronological and typological. In the second part the reader will be referring back to the first; but I wish to fix the chronological frame before discussing vaguer issues of typology, possible utilization and ecology.

CHRONOLOGY; RADIOMETRIC DATING

The 'Sangoan' seems to fall in some areas outside, in others just within the range of radiocarbon-dating. A few finite dates have been published:

REVEZ DUARTE (Mozambique), Layer IV containing M.S.A. and overlying unrolled 'Sangoan', similar to the industry on the coastal dunes of Natal; SR-67 28540 ± 490 (Barradas 1965: 25–9; 1967: figs 2–4).

POMONGWE (Rhodesia), an industry first described as proto-Stillbay, now equated with 'Sangoan', to be considered below; two dates from near the top of the 'Sangoan' and from just above it, SR-8 and SR-9 42200 ± 2300 (Cooke 1963). These dates should be accepted with caution in view of SR-7 > 42200 for the same industry at 20 cm depth, and of dates subsequently published for the Bambata or Stillbay industry (Cooke 1971: Zombepata SR-190 40720 ± 1620, stratigraphically uncertain, and SR-193 37290 ± 1140; Redcliff GrN-5679 $41800 \, {}^{+\,5000}_{-\,3000}$ and GrN-5858 $40870 \, {}^{+\,2300}_{-\,1800}$. But one must make an allowance of at least 5000 years for the statistical margin).

KALAMBO FALLS (Zambia). There is a consistent set of dates from $46100 \, {}^{+\,3500}_{-\,2400}$ (GrN-3228) to $37900 \, {}^{+\,1500}_{-\,1200}$ (Clark 1969) for an industry described as 'Sangoan', though only a summary description without illustrations has yet been published (Clark 1964*b*). There seems to be a slight tendency to argue from dates to industry and then *vice versa*. Clark considers that the later date may be too recent, but the very wide statistical margin allows it to be fitted into the series. Even if the sites are not habitations, the wood should have been derived only a very short distance; it could not have survived unless rapidly buried in wet sediment.

The Kalambo Falls dates imply that the 'Sangoan' there is a fairly late phase of the Middle Stone Age complex, and that it developed during a hiatus of 15 000 years since the Late Acheulian. Two finite dates for the latter about 60000 B.P. (Vogel & Waterbolk 1967: 145) are probably minimal, unless Kalambo Falls was a cultural backwater in both Late Acheulian and Sangoan times. This is unlikely in view of Clark's description of the area as an important highway across the Rift Valley.

MUFO (Angola), an industry described as Lower Lupemban, UCLA-168 38000 ± 2500 (Van Zinderen Bakker & Clark 1962); ferricrete with 'Sangoan', UCLA-709b > 40000 (Clark 1968).

Other samples have been rejected as unable to give reliable finite dates, e.g. landshells (an unsuitable material) from a surface in the dunes at Umgababa (Natal).

In general, all finite dates for the 'Sangoan' may be minimal.[1] It has been claimed that at any rate in southern Africa the Middle Stone Age extends back to the Last Interglacial. I shall show on geological evidence that the 'Sangoan' there is an early variety of the Middle Stone Age, too old to fall within the range of radiocarbon.

CHRONOLOGY; SHORELINES

It has not been possible to use other radiometric dating-methods on the 'Sangoan'. By uranium–thorium the peaks of the Last Interglacial have been determined on corals from several parts of the world as roughly 125000, 107000 and 85000 years B.P. (Bloom *et al.* 1974; Chappell 1974), and on volcanic ejecta as about 140000 and 90000 B.P. (Bonadonna & Bigazzi 1970; INQUA 1975). The first peak was the warmest, the last the coolest. Probably the first two peaks raised ocean-level on stable coasts above present; the third may not have, but on a coast undergoing slow epeirogenesis its beach also may be slightly emerged.[2]

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[1] Recent re-assessment of radiocarbon-dating and consideration of the chances of minor contamination have undermined confidence in finite dates near the limit of radiocarbon; but there are no physical methods of control. Thorium-dating on freshwater-material is unreliable; potassium–argon dating is suspected of giving results 50% too high (see Wendorf *et al.* 1975; Itihara *et al.* 1973).

Several correlations are possible between world-wide episodes of high ocean-level and fossil beach-gravels in the two well-studied areas where industries of 'Sangoan' type occur on the coast, Natal and Ghana. It is widely accepted that on stable coasts ocean-level in Eem I was not higher than +8 - +9 m, but both Natal/East Cape (reversal of the miopliocene submergence, cp. King 1972; Ruddock 1968) and Ghana[3] are emergent areas.

The following schemes seem to me the most reasonable on present evidence; for detailed study of the Natal/Zululand dune-cordons see Davies 1975:

NATAL/EAST CAPE

MID-WÜRM TRANSGRESSION	To well below present S.L.	Formation of Bluff dune-cordon and outer cordon in Zululand, calcified aeolianite with little decalcification
REGRESSION		
BRÖRUP TRANSGRESSION	To below present S.L.	
MAJOR REGRESSION		
EEM III	Mbokadweni Mouth and Umhloti Beach, beach-platform about −0,3 m M.S.L. (Davies 1970, 1972); perhaps +6 m in eastern Cape Province. Warm wet climate in Natal causing decalcification of Berea dune-sands.	
INTERVAL	Perhaps short, sharp cooling, causing some increase of global ice. Disappearance of Swartkops-fauna. Perhaps formation of Berea dune-cordon in Natal.	
EEM II	+8 - +9 m shoreline.	
VERY SLIGHT REGRESSION	Warm-water estuarine Swartkops-fauna continues from +18 to +9 m sea-levels, see Davies 1972.	

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[2] Different chronologies for the Last Interglacial have been suggested by workers in other parts of the world using different data. Without setting out all the schemes in detail, I may record two of the best-known published ones: Eem II about 102000–95000, Eem III 90000 followed by marked global cooling, and a weak warmer episode which could be Brörup about 65000–55000 (Kennett & Huddlestun 1972); Camp Century core, giving a fairly long Eem II with maximum about 95000, followed by a very sharp but cold episode about 90000, a weak warming about 85000 (possibly Eem III) and a rather stronger warming about 75000, but no indication of warmth about 60000 (Dansgaard *et al.* 1971). The claim that sea-level in Barbados dropped to −71 m (figures adjusted to supposed uplift) between Eem I and II (Steinen *et al.* 1973) seems based on a section which has been theoretically reconstructed, and must be held in suspense for the present. All the proposed chronologies seem to register the same set of interglàcial/interstadial peaks.

[3] The evidence for the Guinea coast depends on recently published Holocene dates for Vermetids at altitudes above present sea-level from Sierra Leone to Tema in Ghana (Delibrias in C.N.R.S., *Colloques internationaux* **219**: 127–34).

EEM I	18-metre shoreline, assuming that *Elephas zulu* (= *Loxodonta atlantica*) at Port Durnford lasted to the very end of the Middle Pleistocene; see Hobday 1974).
LOW OCEAN	Deeply submerged aeolianite beneath Durban Bluff.

This scheme assumes that the Berea dune-cordon, in places > 80 m thick, accumulated in a comparatively short period. Its *terminus post quem* is fixed by its resting on the 9-metre terrace at Tugela Mouth, Sheffield Beach and elsewhere. It is less satisfactory to place the cordon after Eem III, because during the Last Glaciation the climate in Natal as in other parts of Africa was cooler and probably drier than today, so conditions would have been unsuitable for decalcification of the sands.

GHANA (see Davies 1967*a*)

REGRESSION	
EEM III	Not exposed.
EEM II	+6 – +8 m shoreline and corresponding river-terraces.
EEM I	Probably +12 – +14 metre shoreline.

No undoubted rolled 'Sangoan' pieces have been found in any raised marine gravels. One or two from a +6 – +8 metre beach in Ghana (Davies 1967*a*: 49) are vaguely of 'Sangoan' type, but are insufficient to associate a 'Sangoan' industry with any exposed gravel of the Last Interglacial. A few lightly rolled pieces from the +9-metre gravel in Angola may indicate the start of a 'Sangoan-type' industry before the abandonment of the beach. In Natal no rolled pieces of 'Sangoan' type were associated with the beach (see below).

On the other hand, unrolled pieces of 'Sangoan' type have been found in Ghana in gravels of both the +14 and the +6 – +8 metre beaches (Davies 1964: 29–31). The most significant site is Asokrochona, where (*pace* Wai-Ogusu 1973, who clearly never bothered to look at my detailed field-notes, nor at the section-drawing based on them and printed in Davies 1967*a*: 48) 'Sangoan-type' picks occurred on the crust overlying the shingle of the +14-metre beach, beneath illuvial mottled clays on which were flakes vaguely of Middle Stone Age type.

In Angola unrolled pieces of 'Sangoan' type, ovates, picks, choppers, blades, and one lightly rolled hand-axe, which cannot be typologically dated, were found on the +9-metre beach at Punta das Vacas (Davies 1962; Clark 1966: 36–7). There were rolled and unrolled pieces of 'Sangoan' type on the +8-metre terrace at Punta do Giraul. Thus a 'Sangoan-type' industry may have started earlier in Angola than in West Africa.

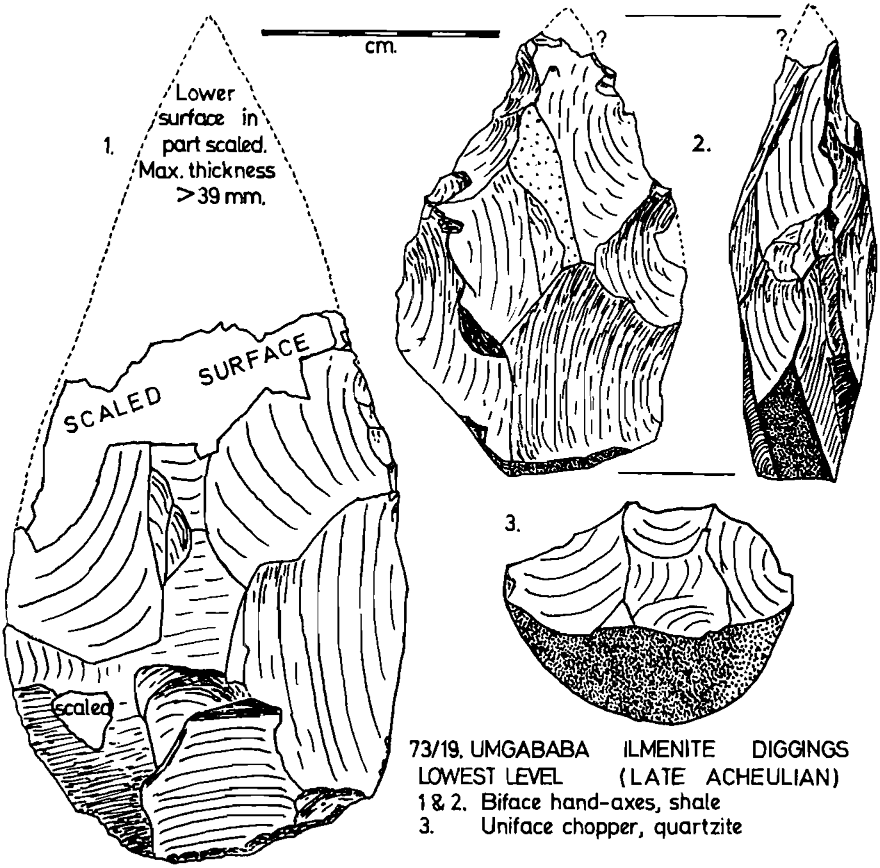
A very few pieces of 'Sangoan' type have been found in Natal associated with the +6 – +9 metre beach. Beater (1967 and *in litt.*) records from the interface of the beach and the overlying Bluff-aeolianite at Tiger Rocks two flakes, which he considers to be smoothed by water-borne rather than wind-borne sand but not rolled. In the same beach I found at Reunion North an unrolled pick, and at Cave Rock an unflaked quartzite pebble which must have been carried at least 10 km. At Jacobs there were unrolled 'Sangoan-type' pieces on a river-sand at +6 m, probably associated with this beach. At the Mgeni mouth Mr R. C. Walsh told me that he had collected 'Sangoan' pieces at +11 m on a ferricrete-layer in a formation which he correlated with Brien's (1935) layer 2; but the description of the stratification is extremely vague. At Ngane Mouth I found (Davies 1970: figs 41–2) in an estuarine gravel at +6 m five rolled pieces which may be 'Fauresmith' or 'Sangoan'. The gravel was sealed by red sand in which, one metre higher, was a stone-line with flakes of Middle Stone Age type.

Thus the 'Sangoan' was in several coastal areas of Africa later than what seem to be two peaks of the Last Interglacial, probably the first and second. On the other hand, a well-defined industry of 'Sangoan' type occurs abundantly close to the surface of the high coastal dunes of the Berea red sand Member of the Bluff Formation in Natal and the northern Transkei. The industry is concentrated on certain sites; none have been excavated, but considerable erosion has revealed the stratification.

On some sites 'Sangoan' artefacts occur on the surface of the red sand or in a ferricrete which caps it, e.g. at the back of La Lucia; probably, however, an upper red sand, usually thin, has been eroded. There is good evidence for erosion at Bazley, where 'Sangoan' pieces occur on the dune-surface along with grit and rolled laterite-nodules. But where precise observation has been made, 'Sangoan' pieces occur 1–2 m below the surface of the red sand (1 m at Scottburgh Carpark; 2 m on the road 3 km north of Hibberdene; 3 m at Howard College, Durban (McCarthy 1967)); occasionally on a line of ferricrete-nodules (Durban, Buttery Road); at Coronation Brickworks, Durban, the ferricrete has formed on a gullied surface, but the 'Sangoan' material could have settled into the gullies and need not postdate them. In places two lines of artefacts have been observed, the 'Sangoan' pieces in the lower, and a less differentiated Middle Stone Age on the surface of the red sand (e.g. Umdoni Park railway-cutting; pit about 1,5 km north of Mzumbe Bridge; probably Southport). The upper red sand may represent a renewed phase of dune-building. Many productive sites, however, are too mixed for the exact stratification to be determinable; the site behind Port Edward Hotel (Van Riet Lowe 1947: site 4) had slumped material with reversed stratification. See below p. 898 and figs 14–23.

A double period of dune-formation would explain the remarkable stratified sequence at Umgababa ilmenite quarry. On a floor carrying Late Acheulian hand-axes is about 6 m of bright red aeolianite (figs 1–3). Between this sand and a whitish calcified dune is a surface with snail-shells, root-tubes, and a few 'Sangoan' pebble-butted picks and flakes (not enough for statistical definition) (figs 4–5). On the surface of the calcified dune is a layer of ferricrete nodules carrying artefacts of Middle Stone Age type but no 'Sangoan' pieces (figs 6–10).

In Zululand two separate cordons of the Bluff Formation form the western and eastern ridges bounding St Lucia Lake. Both rest on a marine platform at about +9 m; the outer platform is cut in cemented marine or aeolian sediments, so the cordon must have been formed after the Last Interglacial. In Natal the two cordons exist only at Durban, the Berea Member and the Calcarenite Member; elsewhere there are traces of an offshore bar, which may be the same as the aeolianite foundation of the Bluff, but the Last Interglacial beach and the overlying cordon are missing.


cm.
1.
Lower surface in part scaled.
Max. thickness >39 mm.
SCALED SURFACE
scaled
?
2.
?
3.
73/19. UMGABABA ILMENITE DIGGINGS
LOWEST LEVEL (LATE ACHEULIAN)
1 & 2. Biface hand-axes, shale
3. Uniface chopper, quartzite

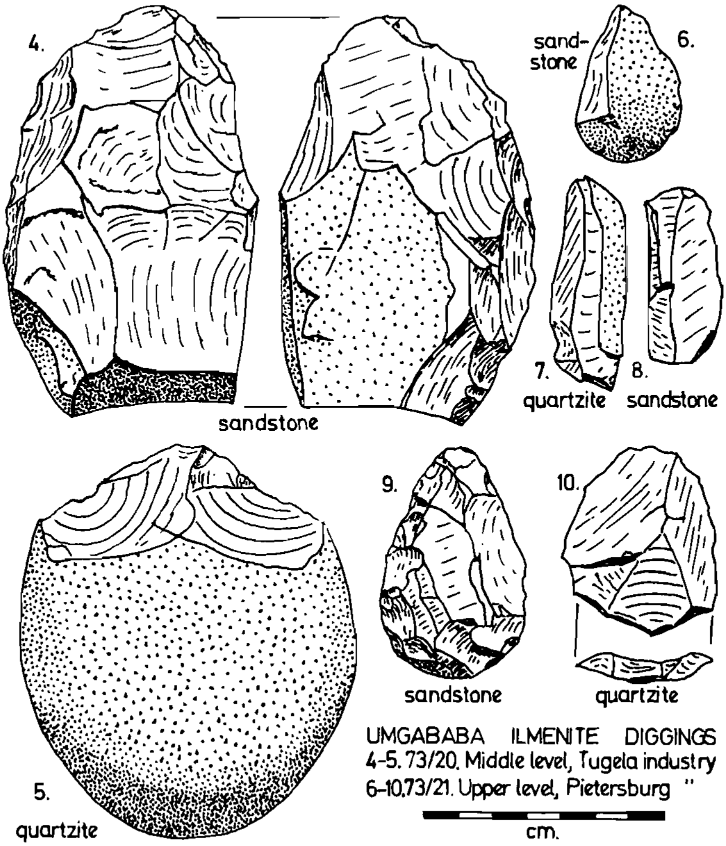
Figs 1–3.

No artefacts or surfaces have been found within either cordon (Davies 1967*b*); so during accumulation both must have been mobile unvegetated dunes, piling up so rapidly that hunters would not wish to approach them and lose stray pieces.

The landward cordon or Berea Member in Natal normally consists of decalcified red sand; there is calcified aeolianite at Burman's Bush, Durban (King & Maud 1964). Near the surface of the dune occur abundant 'Sangoan' artefacts; it is doubtful if any 'Sangoan' pieces occur beneath it. A collection at Johannesburg from Umbogintwini Factory is probably mixed and unreliable; at La Mercy pieces of 'Sangoan' type were found beneath red sand, but it may have slumped.

The seaward cordon or Calcarenite Member consists of partly calcified and patchily consolidated sand, decalcified in places near the surface. I have mentioned 'Sangoan' pieces found on the beach beneath it or at its foot. It is possible that the calcified bed at Umgababa Quarry belongs to the stage of the seaward cordon.

Coastal dunes were almost certainly constructed during marine regressions, when exposures of the continental shelf made available quantities of sand to build dunes up to 150 and 106 m high. The landward cordon is presumably older than the sea-


4.
sandstone
sand-
stone
6.
7.
8.
quartzite
sandstone
9.
10.
sandstone
quartzite
5.
quartzite
UMGABABA ILMENITE DIGGINGS
4-5. 73/20. Middle level, Tugela industry
6-10.73/21. Upper level, Pietersburg "
cm.

Figs 4–10.

ward; the decalcification and ferruginization of its sand are far more mature. It probably formed before the third peak of the Last Interglacial; in which case the Natal 'Sangoan' is to be dated between Eem II and Eem III or slightly later. The Bluff cordon was constructed after Eem III, possibly after the Brörup interstadial, and before the Middle Würm transgression, which Schalke (1973: 35) dates at the Cape after 45000 B.P. It seems to be younger than the Natal 'Sangoan', but older than a more conventional Middle Stone Age industry of Pietersburg type. For the proposed geological sequence see the Table, above, p. 887.

CHRONOLOGY; THE INTERIOR

Geological dating on the coast in reference to sea-level is comparatively easy, because except in highly unstable areas tectonic movement has been small in comparison with glacio-eustatic fluctuations. It is therefore possible to use radiometric dates from other parts of the world, especially thorium-dates which cover a longer range than radiocarbon.

Unfortunately, industries of 'Sangoan' type have been identified mainly in the interior, where correlation with a glacio-eustatic sequence is impossible, and any other correlation speculative. During the Last Glaciation the climate of the interior was cooler and/or wetter than in the interglacials. But if we find association of 'Sangoan-type' industries with evidence for greater moisture, lowering of vegetation-lines and so on, how can we pinpoint them within the 70 000 years? The dating of calcretes, freshwater-molluscs etc. by any radiometric means is in no way secure (cp. the very dubious radiocarbon-dates for calcretes in the Vaal sediments; Butzer *et al.* 1973).

In the interior the 'Sangoan' may occur in four geological horizons, river-gravels, lacustrine beds, dunes and stratified surficial sediments.

RIVER-GRAVELS

Ideally the thalweg of a river grades evenly to the base-level at its mouth; but this is a slow process, never completed if base-level fluctuates within periods of less than one million years. It is further complicated by the hardness of the rocks which the river traverses. Even a very narrow band of hard rock will form a bar, and a large river will almost always scoop out soft rock behind the bar, so that the thalweg will become irregular.

Let us consider what would happen to the thalwegs of short or medium rivers on emerging coasts during the last 130 000 years, flowing over rocks of fairly even hardness, for instance deeply rotted rocks in the equatorial forest. In Eem I a fairly even thalweg would be established near the mouth and would advance only a certain distance upstream to a nickpoint in a previous higher thalweg; during the subsequent period this nickpoint would gradually retreat upstream. On faunal evidence from estuaries along the south coast of the Cape Province, I do not believe in suggested large fluctuations of the ocean during the last interglacial; in the brief cold snap after Eem II (above, p. 887) there would not be time for major build-up of land-ice. Small fluctuations in base-level during the Eem interglacials would initiate new thalwegs at the mouth, with nickpoints into the first thalweg which also would gradually retreat upstream. Some way upstream these thalwegs would coalesce. During the large but sharply fluctuating regression of the Last Glaciation there would be further incision near river-mouths, perhaps less rapid than previously because it had reached unweathered rock, and to a large extent off the modern shore into the exposed continental shelf. The gorge so cut would be filled with mobile sediments as the sea transgressed at the end of the Last Glaciation.

Each thalweg would carry a gravel, of which perched fragments would remain as the river rejuvenated. Tricart's theory (1958, 1961) that chemical weathering is so active in equatorial regions that river-pebbles rapidly disintegrate is not true; the more insoluble minerals, such as quartz and quartzite, do not disintegrate within a few hundred thousand years, but preserve traces even of superficial scars. Thus along a medium or short valley one might find:

(*a*) at the mouth, soft sediments;
(*b*) a little way upstream, two or three gravels belonging to separate thalwegs of the Last Interglacial;
(*c*) a long way upstream, a single gravel belonging to the whole of the Last Interglacial, up to a nickpoint into a terrace-gravel and thalweg of an earlier age.

But though one can identify along most of the thalweg a Low Terrace, its gravel is time-transgressive and will have been abandoned and fossilized at an increasingly later date as one progresses upstream.

Along West African river-gravels, scattered pieces of 'Sangoan' type, unrolled, occur on the Low Terrace (usually 6–8 m above low water), which seems to grade to both the +12 – +14 and the +6 – +8 metre shorelines. I have detailed (Davies 1967*a*: 106) a very few lightly rolled pieces of 'Sangoan' type from Low Terraces of West African rivers far upstream. Rolled 'Sangoan' pieces have been found in basal gravels which belong to the present cycle of rejuvenation. Thus the evidence from river-gravels for the date of the 'Sangoan' is consistent with that from the coast.

The Niger delta and the lower course of R. Niger, flowing over soft sediments in an area of rapid subsidence, has yielded no evidence for the 'Sangoan'. North of the forest, more than 400 km from the coast and near the contact of the Cretaceous with older rocks, a very few unrolled 'Sangoan' pieces have been found on some of the Low Terraces, one or two lightly rolled pieces in the gravel filling an abandoned channel at Izom at 11 m above present river (Davies 1957; Soper 1965). So the Nigerian picture appears to be similar to that in Ghana and Togo.

Because there has been no geologico-archaeological exploration of river-gravels near the coast south of Nigeria, there is no evidence about the position of 'Sangoan-type' pieces. A small unrolled collection from the 13,5-metre terrace of R. Buffels (north-western Cape Province) could be either 'Sangoan' or Acheulian (Davies 1973), but it is unlikely that a true 'Sangoan' industry reached Namaqualand (see below, p. 898).

The lower courses of the Natal rivers have apparently incised very little since the Last Interglacial; the equivalent of gravels in western Africa at 6–12 m above normal river-level seems to be at river-level in Natal. This may be due to the steep coastal mountains, through which narrow gorges have incised. It is not possible to trace terraces through these gorges upstream from raised shorelines. No 'Sangoan-type' pieces have been found in the basal gravels. Unrolled pieces on terraces of R. Mfolozi, Pongola and in the Transvaal at some 15–30 m above the rivers are probably much younger than the gravels.

No connection can be traced between terrace-gravels of the upper courses of long rivers, such as R. Niger, Congo, Orange, Zambezi, which pass over numerous bars and nickpoints, and the datable marine terraces. Gravels far inland can be dated only by unreliable biostratigraphy. The same is true of lacustline beds and of river-gravels grading to large lakes such as Lake Victoria.

'KALAHARI-TYPE' SANDS

Industries claimed as Sangoan have been identified in interior Africa on deep sands, partly aeolian and partly redistributed by illuviation, especially in northern Angola and parts of Zaïre. These industries are typologically different from the 'Coastal Sangoan'; justification of the name will be discussed later. It seems difficult to date 'Sangoan' surfaces on these sands except by arguing in a circle from industry to geomorphology.

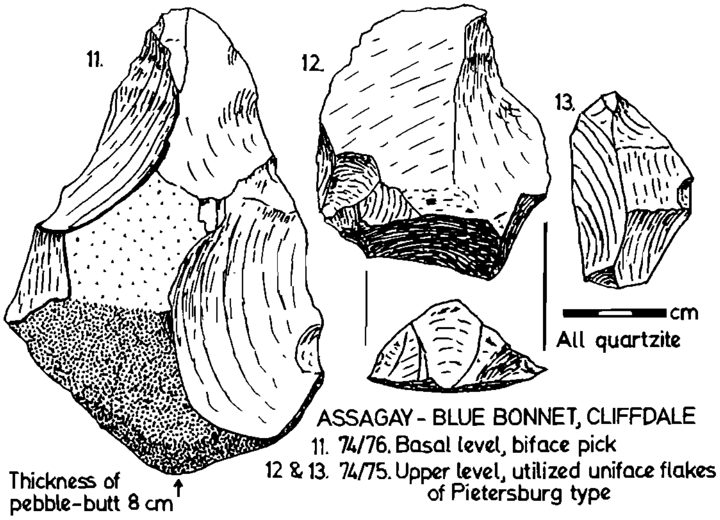
In Lunda Clark (1968; also Van Zinderen Bakker & Clark 1962; Clark 1963: ch. 3) has described sections both in a river-bed and on terrace-gravels. In the former he found a mixed assemblage in a laterite, the latest pieces being typologically Lower Lupemban; from gravel on the laterite he obtained one finite date of 38000 ± 2500 (UCLA-168) and two infinite dates (UCLA-169, UCLA-709b). On deposits of perhaps partly redistributed terrace-gravel he identified Upper Acheulian, overlain by laterite, on which were 'Redistributed Sands II'. In and at the base of these sands were land-surfaces, with Lupemban pieces which he considered of comparatively advanced type. While laterite, after it has consolidated, is seldom liable to stratigraphic disturbance, land-surfaces in and at the base of sand are not sealed sites; they yield concentrations of gravel and stones from a horizon of unknown thickness slumped as a result of the removal of finer sediment by erosion. They are therefore usually time-transgressive, with rather vague limiting dates.

On the basis of one finite and two infinite radiocarbon-dates from Lunda and three infinite dates from the Stanley Pool area (De Ploey 1968; Gilot *et al.* 1965; Dossin *et al.* 1962), Clark claims that 'by ± 45000 B.P. a Late Upper Acheulian had been replaced by a Sangoan/Lower Lupemban' (1968: 129). He also suggests climatic evidence for his correlation, that at approximately the same time conditions became drier and more displuvial in both regions. But the date-range of this industrial transition is too vague to compare with the coastal sequence. The few finite radiocarbon-dates which have been published for an industry that can be described as Acheulian should be accepted as minimal, for instance 60300 ± 750 and 61700 ± 1300 (GrN-1396 and 4896) for Kalambo Falls (Vogel & Waterbolk 1967: 145), and even more GrN-4571 of 38100 ± 500 for Beach A north of Oranjemund (Davies 1973: 755). Thus we cannot satisfactorily pinpoint the end of the Acheulian industry in any part of Africa in relation to the course of the Last Interglacial. The beach in Afar containing a hand-axe which typologically looks rather earlier than End-Acheulian was probably older than the Last Interglacial and was dated a little after 200000 B.P. (Roubet 1969).

STRATIFIED SURFICIAL SEDIMENTS

In both Natal (mostly north of R. Tugela, and into the Orange Free State, according to Professor De Villiers) and in West Africa, under tropical conditions of rainfall between 700 and 1 300 mm p.a., a similar succession of surficial sediments has formed on level or gently sloping plateaux and lower pediments. I have not explored other relevant regions and, so far as I know, neither have my colleagues. I have, however, seen similar sequences in western Zaïre (Davies 1964: 78). In Natal I have provisionally named this sequence the Masotcheni formation.

The lowest member of this formation, resting on rock, is usually a land-rubble, boulders unrolled unless they are derived from some river-gravel or much older conglomerate. In West Africa 'Sangoan-type' artefacts are incorporated in it (Davies 1967*a*: 69–74). In northern Natal the formation occurs outside the area of 'Sangoan-type' spread, and the artefacts in the rubble will be a mixture down to the latest stage of the Acheulian (Fauresmith) (cp. Davies 1951: Chart V 13 from R. Batche near Nqutu). However, a site near Cliffdale, 30 km inland from Durban, has yielded on rotten rock a pick of 'Sangoan' type, a hand-axe and a small high-backed core, and 30 cm higher a disc-core and several flakes (figs 11–13); this stratification corresponds to that of the uneroded Berea dunes.


11.
12.
13.
cm
All quartzite
ASSAGAY - BLUE BONNET, CLIFFDALE
11. 74/76. Basal level, biface pick
12 & 13. 74/75. Upper level, utilized uniface flakes of Pietersburg type
Thickness of pebble-butt 8 cm

Figs 11–13.

In both regions therefore the basal rubble appears to be of roughly the same date. What caused the removal of all finer sediment in such widely separated regions and very possibly elsewhere in Africa I do not know; it may have been some climatic factor. The rubble can be dated only by the latest artefacts in it. Consequently, though it is an identifiable geological horizon, its association with 'Sangoan' pieces does not help to date the 'Sangoan'. Nor can it be regarded as a land-surface for defining an industry, though I shall argue below that heavy concentrations of artefacts in the rubble may be regarded as habitation-sites.

CHRONOLOGY; CONCLUSIONS

I conclude the first part of this paper as follows:

(*a*) Industries called 'Sangoan' are in the main beyond the range of radiocarbon; in Central Africa finite dates (very near the limits of radiocarbon) have been obtained for the last stage of such industries, but may not be reliable.

(*b*) In coastal regions a rather vague time-bracket has been obtained for such industries by correlation with glacio-eustatic fluctuations dated radiometrically in other parts of the world. They are later than but not much later than one of the peaks of the Last Interglacial, probably the second (about 105000 B.P.); and in Natal earlier than an interstadial which may be the third peak of the Last Interglacial (85000 B.P.) or the Brörup (before 60000 B.P.).

(*c*) In the interior 'Sangoan' industries cannot be correlated with satisfactorily datable geological features.

(*d*) In the interior a single name may be used for a number of local industries, if they are industrially similar and regularly occur in a similar but badly dated stratigraphical sequence.

TYPOLOGY

It remains to examine these industries region by region, to see whether a common name can suitably be applied to them. Only sites which have yielded a good many artefacts may be considered, and we must decide whether each site is a land-surface or factory-site, which may be markedly time-transgressive, or an undisturbed habitation-site which is likely not to be so.

Central Africa

The name Sangoan is derived from Sango Bay in Uganda. Though there are at present no strict rules of archaeological nomenclature, it would be best to apply this name primarily in this region, and only secondarily to other regions, whence closely similar industries are known.

The Uganda material occurs in stratified deposits (set out by Van Riet Lowe (1952) in collaboration with Wayland), which are not closely datable and are comprised within Bishop's Orichingan Unit (1967: 525), which covers 'the time span of the Sand and Clay/Silt Members of the Nsongezi Formation and probably ranges in time from uppermost Middle Pleistocene through the Upper Pleistocene to approximately 25 or 20 thousand years B.P.'. Stratification in relation to fluctuating levels of Lake Victoria has been set out by Van Riet Lowe and with considerable revision by Cole (1967: 519), but we cannot correlate this sequence climatologically, even in the broadest sense, owing to the tectonic instability of the region.

Therefore the Sangoan can only be defined industrially; but the absence of uncontaminated sites raises difficulties. Cole concludes that the industry was intrusive to the area and no transition from the Late Acheulian can be discovered.

The tool-kit seems to have been:

Picks, not pebble-butted, often double-ended; they were made of slab-quartzite, though pebbles were apparently available if the pebble-butted type had been desired;
Hand-axes, usually rather thick, elongated or cordiform; some are perhaps really cores;
Core-axes of slug-type, typical of the Early Lupemban;
Core-scrapers of high rounded form (these I have described in West Africa as push-planes);
Side-scrapers;
? Hollow scrapers;
Faceted polyhedrals;
Radially prepared discs;
Choppers;
A very few points;
Fabricators;
Probably some discoidal and high-backed cores;
No cleavers; but Kombewa-flakes and cleaver-flakes probably served for cutting.

Clark regards as Sangoan the industries from Kalambo Falls and from Lunda Province. We await the illustrated publication of Kalambo Falls, but it is difficult to contradict someone who has carefully studied the material. He admits, however (1969: 148, 170), that though he could not separate the Sangoan from the Early Lupemban there, they are not the same industry nor of the same date, and he suggests the possibility of two stages of Sangoan. He has published summaries of the industry

(1964*a* and *b*), from which one notices that he found in association cleavers and knives, which are not recorded from the Uganda Sangoan.

In Lunda Clark found the Acheulian stratigraphically separated from the Sangoan, but not the Sangoan from the Early Lupemban (1963: 73, 104ff.). He found biface lanceheads in association with heavy-duty picks. He clearly felt that these types should not be contemporary, and his sites were land-surfaces carrying thin concentrations of artefacts, mostly on laterite, so may be time-transgressive. He lists the tool-kit (see pls 4–11), which, apart from the few pieces of markedly Lupemban type, is not unlike that which has been reconstructed from South Uganda. Some of his picks are double-ended, and he has practically no pebble-butted pieces. He has no cleavers, and apparently no cleaver-flakes or Kombewa-flakes. He lists a fair number of flakes, but few have been trimmed or utilized.

Clark's description of the 'Zambesi Variant of the Sangoan' from the Victoria Falls area (1950: 86–9) seems on the whole to correspond typologically to his Sangoan in Lunda, though the tool-kit is more varied, and he records a few cleaver-flakes and a fair number of utilized flakes. He apparently found Early Lupemban types in association with crude picks, not pebble-butted; but the absence of pebble-butts could have been due to the use of blocks of chalcedony rather than river-pebbles. He has no radiometric dates for his Victoria Falls sites; but stratigraphically they seem to be on horizons similar to those in Lunda, if it is permissible to compare the stratigraphy of sands and ferricretes in regions so widely separated.

Provisionally, therefore, it appears that there was a comparatively unified industry, at a comparatively well-defined period, over much of the Great Lakes–Zambezi–Upper Congo region. It seems to be a facies of the Middle Stone Age, which may have developed as a result of climatic and ecological controls. Clark writes (1974) with reference especially to this Central African area, in which his work has been concentrated: 'Almost all those archaeological units which have been described as Sangoan from sub-Saharan Africa have a basically similar ecology in that they relate to the high rainfall and thicker vegetation cover and climate of Equatoria and outliers of the equatorial environment . . . giving analogous social and technological responses to similar environmental conditions.' I do not like Clark's (1971) latest and very hesitating suggestion that 'Sangoan' should be a blanket-term for a very large industrial complex comprising almost everything since the Acheulian.

There are a few pebble-butted picks from the Lower Congo basin (Davies 1964: 100), undated and scattered. At Brazzaville they were stratified in a gravel well below the Lupemban (Droux & Bergeaud 1937). A very few from the plain of Kinshasa seem to be of corresponding age and to be earlier than the crude picks 'of mining facies' which parallel the sharp-butted picks from Uganda (Van Moorsel 1968: 94–8). They may be associable with the coastal industry of Angola, which, however, has been identified mostly in the southern part of the territory. Little is known of the Atlantic equatorial coastal regions; a few pieces of Lupemban type are published from Gabon, but nothing which closely resembles the pebble-butted picks from coastal Angola.

None of the collections (Clark 1966: 35–7) from coastal Angola which have been called Sangoan are large enough to define tool-kits, and all are from geological horizons where they may have suffered redistribution. I have shown above that they are considerably older than the radiocarbon-dates obtained from Lunda, and they contain pebble-butted picks. There may be good assemblages on the wide gravel-spreads behind Moçamedes; but during my rapid visit to this area I was unable to search for them, and no one has followed up this line. I do not think that the Angola coastal material, if it forms a single industry, can be called Sangoan.

Rhodesia and South West Africa

South of Victoria Falls several sites and industries in Rhodesia have been called Sangoan (Clark 1950: 89–98; Jones 1949: 25–31). They start with fairly crude tools, including a few hand-axes but hardly any picks. Two finite dates for the 'Sangoan' from Pomongwe (SR-8 and 9, 42200 ± 2300; Cooke 1963) correspond to dates from Lunda. The Rhodesian industries developed apparently not towards the Lupemban biface, but into the Charama (proto-Stillbay) industry with a few hand-axes and picks, and especially large flake-tools utilized on the edge (Cooke 1966; Jones 1949: fig. 9). This industry spread into South West Africa and as far as R. Olifants (Davies 1955; Davies 1964: 146 nn. 83–4; cp. MacCalman & Viereck 1967). This divergence may have been due to abandonment of the forest and wooded savannah for open high-veld and desert, i.e. to different needs under different ecological environments. I am doubtful if the Rhodesian material can justifiably be called Sangoan without qualification; Cooke more suitably uses the term Gwelan, from the surface-site on Gwelo Hill where it occurs abundantly. Certainly the industrial sequence in Rhodesia and south-westwards is unconnected with the Natal coastal 'Sangoan'.

Natal and South Zululand

Artefacts of 'Sangoan' type occur principally on the red dunes of the Berea Member. On many exposures there are only a few, on some none. At certain places there are large concentrations, which must represent settlement sites. However, some of these concentrations are too mixed with later material to be usable, for instance Tinley Manor, Tongaat Mouth and Izotcha Redhills; or reports are too vague (Durban Redhill). A few pieces of 'Sangoan' type have been found near the Natal rivers and on interfluves west of the cordon and several kilometres inland, as far as the Mzimkulwana Cement Works and the Msunduze bridge west of Pietermaritzburg; none of the abundant collections of Old Stone Age material from the middle Mgeni valley (Valley of a Thousand Hills, between the nickpoint at Albert Falls and the Inanda narrows) appear to belong to this stage.

It is difficult to describe adequately the tool-kit of the 'Natal Sangoan' owing to erosion, which has on some of the richest sites removed the relevant land-surface and slumped the material, and owing to poor collecting by amateurs who have selected attractive pieces, moved them around, or removed and lost them. On two sites which had been little collected I attempted on measured areas a count of worked artefacts as against unworked manuports of workable and unworkable stone (Davies 1967*b*). Near Hibberdene, though quartzite boulder-beds are not abundant, several artefact-concentrations are known; the amount of unworkable material greatly exceeds that of worked and workable stones. From a poor concentration at Hyde Park I counted 52 worked as against 44 unworked stones, some of the latter being quartzite, others poor material such as tillite.

This industry was first described from Red Hill, on the north bank at Tugela Mouth (Cramb 1935; Cramb 1937; see Malan 1945). Most of the site is now grassed and reclaimed, but I noticed on the northern end of the dune a scatter of artefacts. Cramb's rough section indicates heavy erosion with uneroded islands; he collected his material (indiscriminately) at the interface of red sand and the overlying humic layer 2–2,5 m deep. The dune-slopes were steep, so it is probable that the original surface had long disappeared. There was also on the site a little Wilton material and pottery.

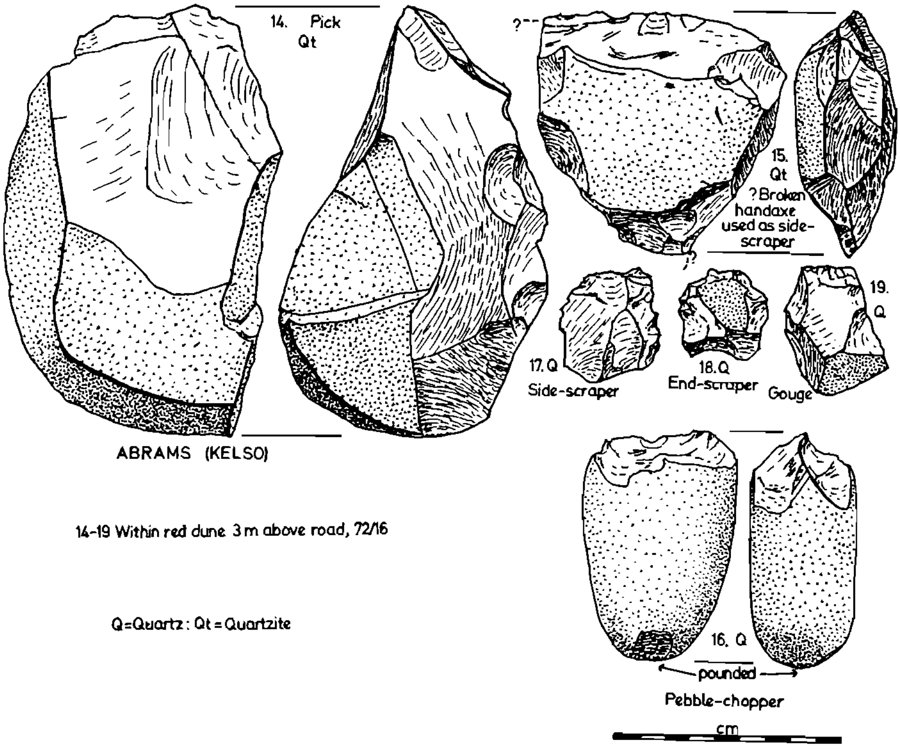
There are many artefacts in Johannesburg (Department of Archaeology, University of the Witwatersrand) and Durban Museum, miscellaneously collected. Most are made from quartzite pebbles, which must have been carried from fossil beaches inland, but no notice was taken of unworked pebbles; Cramb states that there was no lydianite, but some smaller pieces which he deposited in Johannesburg are of this rock. No statistical count is possible, because many pieces may have been removed to private collections and since lost or jettisoned. The principal types which Cramb details and which I have seen in the preserved collections are:

Uniface or partly biface picks from quartzite pebbles, with pebble-surface on the butt: very numerous;
Biface picks and hand-axes with little or no pebble-surface, some very flat and thin: some;
Pebble-choppers or core-scrapers: a few;
Miniature picks: fairly numerous;
Discoidal scrapers;
Polyhedral hammer-stones or mullers;
Cores, blades and points of Middle Stone Age type, many small, some retouched on the edge: numerous;
11 complete or broken fine biface quartz points;
3 side-scrapers;
1 quern; 1 pestle.

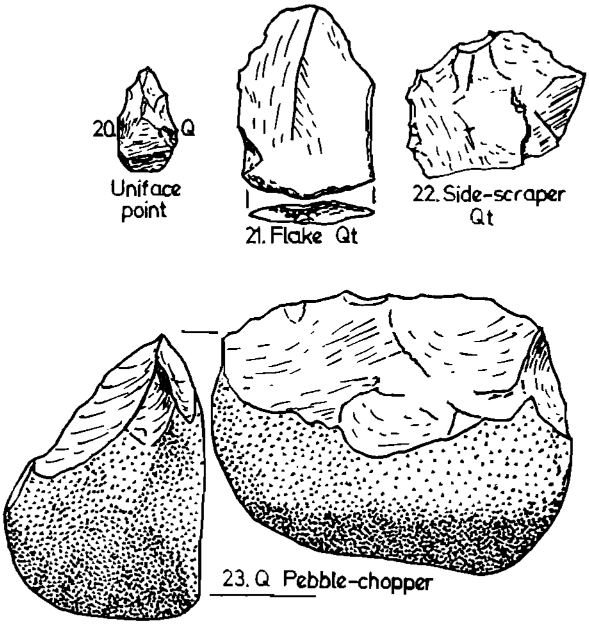
Some pieces are illustrated by Cramb; I have not had the opportunity of going over the available collections in detail and making drawings, nor would such give a fair picture of the industry. It is strongly suspected that two land-surfaces had coalesced and that some of these items do not belong to the 'Natal Sangoan'.

Other sites on the Natal coastal dune have been so abominably collected in the last three decades that probably less than 10% of the tools have reached any museum. Even the typology of the industry has to be pieced together from here and there. It will be impossible to attempt a statistical count until, as has recently been proposed, an uneroded area is taken over and carefully excavated. The only reliable count is from the two vertical roadcuts at Abrams; but 17 pieces collected were too few to be significant. Dr Maggs and I were the first to examine this site, and were able to isolate material from the different surfaces. We took from the 'Natal Sangoan' level: 2 pebble-butted picks of quartzite, 1 miniature pick, 1 pebble-chopper, 2 steep-nosed end-scrapers, 1 quartz gouge, 1 probable quartz core, 7 flakes of quartz and quartzite (some probably used), 2 broken quartz fragments (figs 14–19; by contrast, cf. figs 20–23 from the surface of the dune).

On the dune south-west of Port Edward there are three large exposures, wrecked

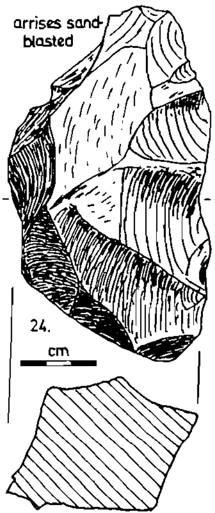

14. Pick
Qt
?
15.
Qt
? Broken handaxe used as side-scraper
?
17. Q
Side-scraper
18. Q
End-scraper
19.
Q
Gouge
ABRAMS (KELSO)
14-19 Within red dune 3 m above road, 72/16
Q=Quartz : Qt = Quartzite
16. Q
pounded
Pebble-chopper
cm

Figs 14–19. Abrams, lower level.

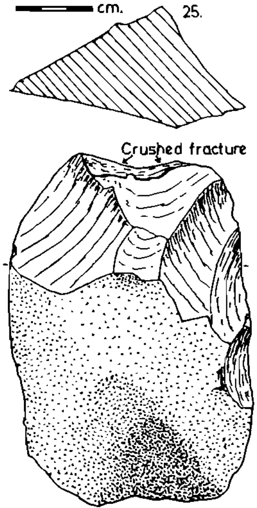


Figs 20–23. Abrams, upper level.

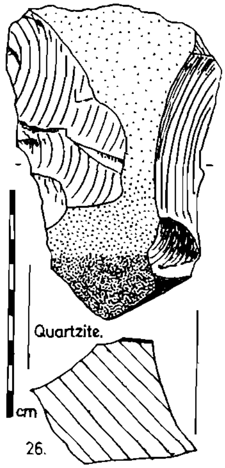
by bad collecting. That at Helengon on the national road has yielded only a few pebble-butted picks, hand-axes and choppers (core-scrapers) and one large side-scraper (fig. 24). The Lower Red Desert, as defined by King (1941), has largely been destroyed by road-works. No clean sections were preserved even earlier, and there seems to have been coalescence of a 'Natal Sangoan' and a Middle Stone Age surface with some contamination of Wilton material (Walsh & Swan 1952: fig. 16). I found there in 1948 seven rough cleavers and a gouge (fig. 25). Though at this site there seems to underlie the dune a beach on which Acheulian artefacts could occur (Davies 1970), the cleaver must be accepted as a rare component of the 'Natal Sangoan' tool-kit, as it has been found on dune-surfaces above any beach-gravel at Coronation Brickworks (fig. 26), Hibberdene and Mzumbe Bridge. On the wall and on islands of the Upper Red Desert it is clear that only one land-surface exists. Probably pebble-butted picks were the commonest tool there, but there has been so much irresponsible collecting that on a measured area the worked pieces were less than 15% of the total count (Davies 1967*b*).



7/59 HELENGON, P.EDWARD
Handaxe/side-scraper, q-tzite.



48/2 GOUGE, Quartzite
PORT EDWARD, Lower red desert.



48/60 DURBAN N., CORONATION BRICKPIT
Cleaver from Tugela horizon

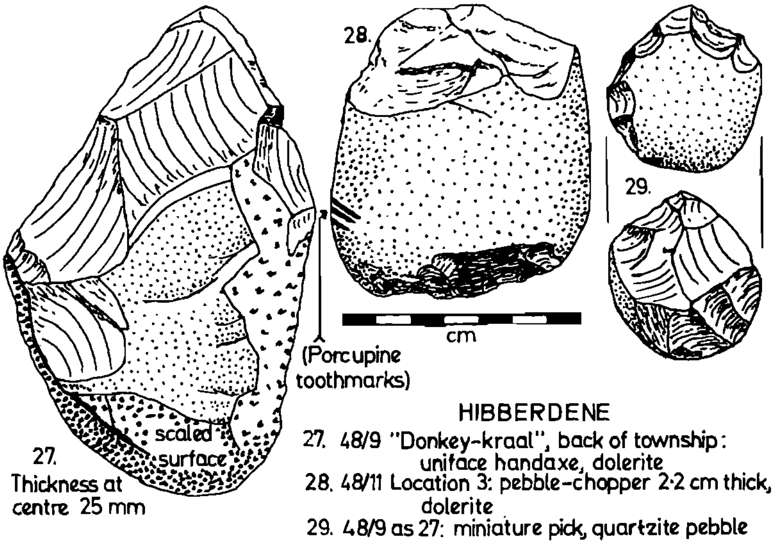
Figs 24–26.

There are two exposures near Hibberdene. In Location 3, 3,3 km north of the railway-station, there has probably been contamination from a Middle Stone Age level; the types which seem to belong to the 'Natal Sangoan' are pebble-butted picks, small hand-axes, cleavers, choppers (fig. 28), large points and a large side-scraper. The second site, the 'Donkey kraal' behind the township, has been much collected and seems to have had considerable contamination (figs 27, 29).

To sum up, the tool-kit of the Natal coastal 'Sangoan' industry is roughly:

Pebble-butted picks, uniface and biface; figs 5, 11, 14, 27, 31; Davies 1951: chart IV 11 and 12.

Biface picks or hand-axes with little or no pebble-surface; figs 4, 15 ?, 24.

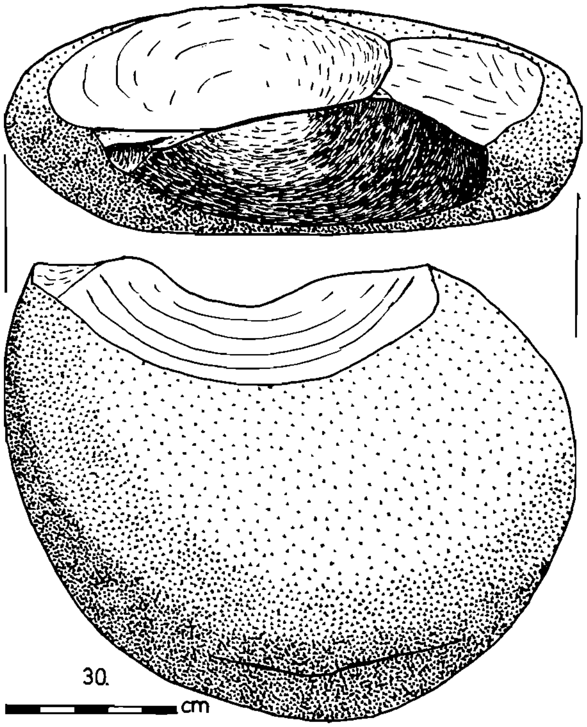

28.
29.
cm
(Porcupine toothmarks)
scaled surface
27.
Thickness at centre 25 mm
HIBBERDENE
27. 48/9 "Donkey-kraal", back of township: uniface handaxe, dolerite
28. 48/11 Location 3: pebble-chopper 2·2 cm thick, dolerite
29. 48/9 as 27: miniature pick, quartzite pebble

Figs 27–29.

Miniature picks; fig. 29; Davies 1951: chart V 14.
Pebble-choppers (core-scrapers); figs 16, 28.
Cleavers (rare); fig. 26.
Steep-nosed end-scrapers (core-scrapers); fig. 28 bottom side.
Thick side-scrapers; figs 15, 24.
Large gouges; fig. 25.
Small side-scrapers; fig. 17.
Small end-scrapers; fig. 18.
Small chisel or gouge; fig. 19.
Large point.
Biface quartz points; Davies 1951: chart V 15.
Discoidal scrapers; in Tugela Mouth series.
Pestles; fig. 16.
Cores, pyramidical and lunate; ill. Niddrie & Davies 1952, fig. 30.

It is not unlikely that other small flake-tools have not been noticed.

I have described (Niddrie & Davies 1952) what I would call the Mfongosi Variant of the 'Natal Sangoan' industry. This occurs along the fairly wide Tugela Valley below the nickpoints near Colenso; the lowest recorded site is at Middle Drift, some 80 km from the mouth. None of the Mfongosi sites are datable geologically; several are on rocky slopes just behind the modern flood-plain, so overlooking it as it built up from the time of the basal gravels which contain Late Acheulian material. No sites are sealed, all are small; but the artefact-types, pebble-butted picks and cleavers and polyhedral stones, correspond roughly to the coastal collections. Particularly characteristic are the cores and the flakes. There are pyramidical cores but hardly any of Victoria West type; and especially lunate cores, which seem to have been formed by throwing a large rolled pebble at an anvil. This form of fracture occurs mainly in dolerite, occasionally in quartzite (fig. 30).



48/66 Lunate Core, quartzite: REDHILL, DURBAN NORTH

Fig. 30.

Despite the absence of radiometric dating and the unsatisfactory nature of the principal sites, we have enough material from coastal Natal to locate its industry within the African palaeolithic frame. It seems on geological ground to date from early in the Last Glaciation, i.e. between perhaps 100000 and at latest 60000 B.P., markedly before the 40000+ range of the Central African Sangoan (according to the radiocarbon-dates). Its tool-kit does not closely correspond to the true Sangoan. It seems to have no tendency towards Lupemban types. Its most characteristic tool is the pebble-butted pick, a tool which was not common in the true Sangoan. I suspect that the Natal pick was intended for digging, perhaps for tubers in the coastal bush, possibly for game-traps.

The association of the Natal coastal industry with the Sangoan of Uganda was mooted in 1948 by Professor L. C. King and Mr D. Niddrie, in conversation with myself newly arrived in Africa, at a time when the principal Central African sites were unknown, radiometric dating had not started, and typological analysis was in its infancy. It was confirmed in print by Clark (1950: 95). I conclude now that in Natal this name must be discarded, and we should revert to the original name given by Mr Cramb, the Tugela industry.

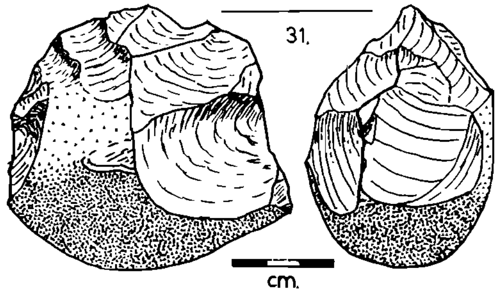
North Zululand, Transvaal, East Rhodesia, East Zambia

At a time when I considered the Tugela industry to be an off-shoot from the Sangoan of Uganda, I tried to trace its distribution from the north (Davies 1952). I recorded on river-gravels of the Lowveld several sites, which are difficult to date geologically far from the coast, and cannot be used statistically.

North of R. Mfolozi the Lowveld is bisected by the steep range of the Lebombo Mountains, through which larger rivers cut in narrow gorges. From outside the range there are very few scattered pebble-butted picks of Tugela type in northern Zululand, between the mountains and R. Pongola (Davies 1951: chart V 14), also at Ekuseni and on the 9-metre terrace of R. Hluhluwe. From Mozambique sites are vaguely reported, especially a collection in Johannesburg (Department of Archaeology, University of the Witwatersrand) by Barradas (1942) from Magude on R. Incomati, with lanceolate and cordiform hand-axes, pebble-butted picks, pebble-choppers and flakes, a collection which resembles the Tugela industry but may be older. So far as we can tell, east of the Lebombo Mountains the industry kept to the foothills and avoided the swamps and the coastal dune (if it was already formed).

West of the Lebombo I collected picks and other pieces of Tugela type on the 20-metre gravels of R. Mkuze (fig. 31) and Pongola. The only terrace where I found them in Swaziland is at 15 m on R. Lomati. Exploration was not possible within the Kruger Park; but I made small collections on gravels in the valleys of R. Crocodile and west of the Park, which though undatable seem to resemble the Tugela industry.

Mason's (1962: 184–97) 'Earlier Sangoan' from Blaaubank is quite unlike either the Tugela industry or the Central African Sangoan, and to judge from degree of abrasion and weathering on an unstratified site, falls far outside the chronology of these industries; so his name is unjustified. His 'Late Sangoan' (pp. 290–7) also has been defined on unstratified and undatable rubbles; the tool-kit is unlike that of the Tugela industry and is suggestive of the Central African Lower Lupemban; but it is not justifiable to call it either Sangoan or Lupemban, in view of the geographical separation and the uncertainty of its date.



49/83 Pick: MKUZI BRIDGE, 18-m. Terrace; Quartzite.

Fig. 31.

I have no evidence for an industry of Tugela type north of R. Letaba or in eastern Rhodesia. So I do not now think it possible to associate the Luangwa Variant in eastern Zambia (Clark 1950: 84–7; 1954), despite the resemblance of its pebble-butted picks. It seems to be dated only by a climatic sequence now regarded as unreliable; apart from the picks, its tool-kit does not correspond to the Tugela industry.

We may therefore define the Tugela industry geographically. So far as exploration has progressed, it is most abundant on the coastal dune of the Berea Member in

Natal, from R. Tugela to R. Msikaba, where the red dune disappears; there are outliers inland up some river-valleys, but nowhere above the major nickpoints where the rivers incise the Middleveld into deep gorges. There are outliers to the north, on the red dunes as far as R. Mfolozi and on the eastern foothills of the Lebombo Mountains, perhaps into Mozambique. There are vague and poorly defined indications of the industry in the trough formed by the erosion of softer Karoo rocks west of the sharp line of the Lebombo Mountains to far north in the Transvaal; it is particularly in this area that exploration may discover large and well-sealed sites which invite comparison or contrast with those of coastal Natal.

West Africa

I have collected 'Sangoan-type' artefacts from many sites in Ghana and Togo, from a few in Ivory Coast, Dahomey and Nigeria.[4] Many of these sites are geological horizons yielding only a few artefacts, so unsuitable for defining an industry. A few seem to be habitation-sites or heavily occupied land-surfaces; though remains of habitations have not been found, they are probably not markedly time-transgressive. Tool-kits defined from them can with caution be supplemented by finds from small sites on geological horizons.

The site at Legon Botanic Gardens (Davies 1968), selected by Wai-Ogusu (1973) as the only sealed assemblage, is unsuitable for our purpose because the artefacts occurred above, in and at the base of the rubble, which itself is time-transgressive.

Some sites at the foot of Awudome Ridge seem to be occupation-surfaces. They are not factory-sites, which would have yielded numerous small flakes. The largest collection is from Bame (Davies 1964: fig. 18; 1967*a*: fig. 16), where artefacts lay on an irregular stone-line on rock, beneath about 30 cm of pisolithic laterite. There was similar stratification at other sites along the foot of the ridge, especially at Anum Junction, the artefacts being in or at the base of cemented or nodular laterite just above rock, on which there was sometimes a line of rubble. These sites are suitable for typological enumeration but not for statistical treatment. There are a few sufficiently large collections from elsewhere, such as Kunkoa in northern Ghana and Kpele-Beme in Togo. None of the sites on raised beaches or river-terraces have yielded more than a few pieces, so that though they can define the chronological position of the industry they cannot be used for its industrial typology.

The generalized tool-kit which I have put forward (Davies 1957; 1964: 101–5; 1967*a*: 116) is as follows:

Heavy picks, most fairly short and stubby, sometimes made on pebbles, sometimes from high-backed cores. A pebble-butt was sometimes left, sometimes the butt was trimmed so that it would be easy to hold, sometimes it is sharp; there is no indication of hafting.

A few hand-axes, piriform and ovate.

Perhaps a few disc-hand-axes made on pebbles, flaked around the edge except on the butt.

Probably no cleavers, but some cleaver-flakes.

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[4] Sites in Ghana and Togo are shown on the map in Davies 1964: 24, and are here recorded only with geographical co-ordinates.

Probably a few large blades.
Large end-scrapers or core-scrapers, perhaps used as push-planes.
Occasional gouges.
Perhaps a coarse piercer.
Side-scrapers and lunate scrapers.
Large hollow scrapers.
Perhaps trap-weights nicked at the sides.
Pebble-choppers.
Disc, pyramidical and 'Perdehoef' cores.
Apparently a few pieces made on small flakes or blades.

This tool-kit exhibits marked differences from the industry of Central Africa which can most suitably be called Sangoan, especially in the picks and hand-axes, the absence of Early Lupemban core-axes, and occasional use of archaic types of core formerly called Victoria West. Refined Levallois-technique seems rare. The date of the West African industry is uncertain, although it occurs in well-defined geological contexts. Apart from its being later than some stage of the Last Interglacial, it cannot be correlated with any of the other industries I have discussed. Climatic correlations are most unreliable.

I therefore do not think that the name 'Sangoan' is suitably used in West Africa. I started to use it in Ghana, and it was approved by Dr Leakey when he visited us, on the ground that the industry is generally comparable to the other 'Sangoan' industries then vaguely recognized. I think that the industry is sufficiently defined to be named, and in view of its abundance along the range of Togo–Akwapim Quartzite east of R. Volta, where other prehistoric industries are rather scarce, I would propose the name Awudome industry.

That at a later date there was some association between Central and West Africa is shown by the rare biface points of Upper Lupemban type found in Ghana (Davies 1967*a*: 126). I do not, however, think that the industry around Bamako and in north-west Mali is justifiably called either Sangoan or Lupemban (Davies 1964: 112–15). The sites are on surface, perhaps factories used for a long period. They yield pieces resembling Acheulian, Lupemban and probably neolithic. The industry awaits more precise definition. A similar industry at Cap Manuel, Dakar, which I took to be Sangoan because of the use of a technique for large flakes similar to the Mfongosi Variant in Natal, is now shown by radiocarbon to be neolithic (Descamps & Démoulin 1969).

CONCLUSIONS

Clark thinks that the Central African Sangoan was an ecological response to conditions at the end of an arid period, when increasing woodland required heavy-duty tools such as picks, thicker hand-axes and core-scrapers. His stratification in Lunda hardly bears out this theory, as the Sangoan/Early Lupemban occurs on laterite and beneath Redistributed Sands II.

In West Africa heavy picks and other tools may be associated with aridity, because they occur especially near rock in rubble whence finer sediment has been removed, beneath sediments which presumably built up with greater humidity and were then lateritized under more displuvial conditions. The great rarity of Acheulian types, better suited to open country, suggests that before this arid period thick forest had prevented human habitation, and in fact man was living nearer the Sahara.

In Natal heavy picks came into use after the red dunes were stabilized by vegetation. There had been an arid period inland, when finer sediments were removed from hill-slopes; we do not know if it coincided with dune-formation on the coast, which was due rather to marine regression and to stronger eastern or south-eastern winds, which should have brought moisture. The dunes could not have been occupied before their accumulation was completed.

There is no reason to assume that these postulated arid periods in different parts of Africa were contemporary or similar. Erosion and the destruction of vegetation could have been caused by reduction of total rainfall, by strongly displuvial conditions especially with increased lightning-storms, or even by man recklessly employing his newly discovered toy, fire, for hunting. Especially on fragile soils, on slopes and on unconsolidated 'Kalahari-sands', regular fire-setting could rapidly thin the trees and bushes, the plants most competent to prevent erosion because of their spreading roots.

Secondly, are the heavy-duty tools I have discussed comparable? I believe not. The coarsely flaked, pebble-butted pick, usual in Natal and common in West Africa and on the Angola coast, could conveniently be held in the palm and used with a downward blow for grubbing insects, tubers and so on. It is seldom long enough to dig a game-trap out of which an animal could not step, and there is a little evidence for fall-traps. Tubers in particular require cooking. So the pebble-butted pick may be a consequence of the discovery of fire. Other West African picks without pebble-butts look as if they may have been used as scrapers, perhaps for abrading wood. The discovery of pieces on river-terraces in thick forest could indicate the use of hollowed logs as canoes, though the earliest evidence for such, at Limbisi, is Holocene (Davies 1967*c*).

The Central African picks are usually longer than the West or South African, sharp at both ends, sometimes with a blade at one end (cp. Clark 1963: 118 and pls 6 and 7). They would be most uncomfortable to hold in the palm, and are rather short to grasp sideways. Before 40000 B.P. the principle of the two-piece tool with handle was known; so they could have been mounted as pick-axes, perhaps for woodworking. Wear on the edge, noted by Cole (1967), could be caused by a poorly attached handle.

I think therefore that typological convergence has been effected by similar ecological conditions in different areas at different times. The name 'Sangoan' has been misapplied to industries of widely separated date and area. It should be restricted to Central Africa, where it belongs. Other names should be used for an industry of partly Sangoan parentage in Rhodesia, and for rather similar but unrelated industries in Natal/Transvaal, Ghana/Togo, and probably in other parts of Africa.

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TOPOGRAPHICAL INDEX

AN	Angola	SWA	South West Africa
CO	Congo	TK	Transkei
CP	Cape Province	TO	Togo
GH	Ghana	TV	Transvaal
MO	Mozambique	UG	Uganda
NA	Natal	ZA	Zaïre
RH	Rhodesia	ZM	Zambia
SW	Swaziland		

Abrams NA	30°21′S	30°43′E
Anum Junction GH	6°24′N	0°21′E
Asokrochona GH	5°36′N	0°03′W
Awudome GH	6°25–40′N	0°10–20′E
Bame GH	6°40′N	0°21′E
Batche River NA	28°12′S	30°40′E
Bazley NA	30°27′S	30°40′E
Berea, Durban NA	29°51′S	30°58′E
Blaaubank TV	24°45′S	27°45′E
Bluff, Durban NA	29°53–59′S	30°58′–31°04′E
Brazzaville CO	4°14′S	15°14′E
Buffels River terrace CP	29°38′S	17°06′E
Cave Rock, Durban NA	29°52′S	31°04′E
Cliffdale site NA	29°48′S	30°43′E
Coronation Brickworks, Durban NA	29°48′S	31°01′E
Crocodile River TV	25°30′S	31°40′E
Ekuseni NA	27°50′S	32°20′E
Gwelo RH	19°27′S	29°49′E
Hibberdene 'Donkey kraal' NA	30°34′S	30°34′E
Hibberdene, 2 sites to north NA	30°33′S	30°35′E
Hluhluwe Bridge NA	28°02′S	32°18′E
Hyde Park NA	29°15′S	31°24′E
Izotcha NA	30°47′S	30°24′E
Jacobs, Durban NA	29°58′S	30°59′E
Kalambo Falls ZM	8°35′S	31°13′E
Kinshasa ZA	4°18′S	15°18′E
Kpele-Beme TO	7°05′N	0°44′E
Kunkoa GH	10°49′N	0°45′W
La Lucia NA	29°44′S	31°04′E
La Mercy NA	29°39′S	31°08′E
Lebombo Mountains NA SW TV	25°–28°S	31°50′–32°10′E
Legon GH	5°39′N	0°12′W
Limbisi GH	9°36′N	1°24′W
Lomati Bridge SW	25°46′S	31°25′E
Luangwa River ZM	11°–15°S	31°–33°E
Lunda Province AN	7°–11°S	18°–22°E
Magude MO	25°02′S	32°40′E
Masotcheni NA	28°17′S	30°34′E
Mbokadweni Mouth NA	30°01′S	30°56′E
Mfolozi River terrace NA	28°27′S	32°07′E
Mfongosi NA	28°44′S	30°49′E
Mgeni Mouth, Durban NA	29°48′S	31°02′E
Middle Drift NA	28°54′S	31°02′E
Mkuze Bridge NA	27°36′S	32°01′E
Moçamedes AN	15°10′S	12°09′E
Msikaba Mouth TK	31°20′S	29°58′E
Mufo AN	7°38′S	21°24′E
Mzimkulwana Cement Works NA	30°40′S	30°20′E
Mzumbe Bridge NA	30°37′S	30°33′E
Mzunduze Bridge NA	29°41′S	30°10′E
Ngane Mouth NA	30°11′S	30°49′E
Olifants River CP	31°40′S	18°30′E
Oranjemund, site on Beach A SWA	28°12′S	15°58′E
Pomongwe RH	20°32′S	28°30′E
Pongola River terraces NA TV	27°25′S	31°32–58′E
Port Durnford NA	28°55′S	31°55′E
Port Edward Hotel NA	31°03′S	30°14′E
Port Edward 'Red Deserts' NA	31°04′S	30°12′E
Punta das Vacas AN	12°35′S	13°22′E

Punta do Giraul AN	15°07′S	12°08′E
Redcliff RH	19°01′S	29°46′E
Redhill, Durban NA	29°46′S	31°02′E
Reunion North, Durban NA	29°58′S	30°59′E
Revez Duarte MO	26°02′S	32°24′E
St. Lucia Lake NA	27°53′–28°16′S	32°25–31′E
Sango Bay UG	0°51′S	31°42′E
Scottburgh NA	30°17′S	30°46′E
Sheffield Beach NA	29°29′S	31°15′E
Southport NA	30°41′S	30°30′E
Stanley Pool ZA	4°15′S	15°25′E
Swartkops CP	33°52′S	25°36′E
Tema GH	5°37′N	0°00′W
Tiger Rocks NA	30°00′S	30°57′E
Tinley Manor NA	29°27′S	31°17′E
Tongaat Mouth NA	29°33′S	31°12′E
Tugela Mouth, Red Hill NA	29°13′S	31°30′E
Umbogintwini Factory NA	30°01′S	30°54′E
Umdoni Park NA	30°24′S	30°42′E
Umgababa Quarry NA	30°08′S	30°50′E
Umhloti Beach NA	29°40′S	31°07′E
Victoria Falls ZM	17°55′S	25°51′E
Zombepata RH	16°50′S	30°49′E